

Gp 1103



PATENTS

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Applicants: Donald R. Huffman
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INFORMATION DISCLOSURE STATEMENT

Sir:

In accordance with the duty of disclosure under 37 C.F.R. §§1.56, 1.97 and 1.98, applicants, are making a record of art for consideration by the United States Patent and Trademark Office. The art is listed on the accompanying PTO 1449 form, the contents of which are incorporated by reference. The art is also listed hereinbelow:

U.S. Patent No. 4,132,671

U.S. Patent No. 3,317,354

U.S. Patent No. 4,922,827

U.S. Patent No. 5,132,105

U.S. Patent No. 4,915,977

U.S. Patent No. 4,767,608

CERTIFICATE OF MAILING UNDER 37 C.F.R. 1.8(a)

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Dated: March 4, 1997

Mark J. Cohen

VIA OF Patent 03-10/97 (04 10/97)
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U.S. Patent No. 4,435,378
 U.S. Patent No. 2,957,756
 U.S. Patent No. 4,435,375
 U.S. Patent No. 2,635,994
 U.S. Patent No. 3,009,783
 U.S. Patent No. 3,172,774
 U.S. Patent No. 4,167,444
 U.S. Patent No. 5,114,477
 U.S. Patent No. 5,234,474
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Zhang et al., Reactivity of Large Carbon Clusters: Spheroidal Carbon Shells Their Possible Relevance to the Formation and Morphology of Soot, The Journal of Physical Chemistry, 90(4), 1986, pp. 525-528.

The present application is a continuation of USSN 07/580,246, filed August 10, 1990 which is a CIP of USSN 07/575,254, filed on August 30, 1990. Applicants are relying upon each of the above-identified applications for an earlier filing date under 35 U.S.C. §120.

Much of the art listed hereinabove and in the accompanying PTO-1449 form was made of record in at least one of the above applications, particularly USSN 07/580,246. Inasmuch as a copy of much of the art listed hereinabove and in the accompanying PTO 1449 form has already been submitted in one of the above-identified applications, in accordance with 37 C.F.R. §1.98(d), applicants are not forwarding a copy of these references. Accordingly, applicants are enclosing a copy of only that which is newly cited.

Most of the art listed therein is in the English language. However, a few are not in English. In accordance with 37 C.F.R. §1.98(a)(3) a concise explanation of the

relevance, as it is presently understood, is summarized hereinbelow.

Keller, in GIT Fachz Lab., 1987, 31, 618-623 discloses that the irradiation by intense laser light of their graphite foils causes the vaporization of carbon fragments which can be identified by mass spectroscopy. According to the author, the mass spectrum indicates that C60 possesses special stability. The article confirms the stability of the C60 since there was practically no reaction of C60 with, inter alia, gaseous NO, SO₂ and NH₃.

Anales Astrophysic, "Etude De Poussieres De Fer et De Carbone," J. Lefevre, Tome 30, Annee, 1967, Fasc 4, pp. 731-738, discloses that carbon and ion grains have been produced in argon arc discharge. The article discloses that the grains are associated in chain-like structures.


The other two references not in the English language, JO 2221-194A and JO 2160-696, had abstracts in the English language attached thereto. These abstracts attached thereto are incorporated herein by reference.

In addition, the Russian Patent 1,587,000 and West German Patent 2,414,215 are also not in the English language, but these were cited by the U.S. Patent and Trademark Office in U.S.S.N. 08/236,933. Thus, a translation thereof and/or abstract thereof was provided in this application, and the contents thereof are incorporated by reference.

Consideration of the Information Disclosure Statement is respectfully requested since the art provided may be material to the examination of the present application, as defined in 37 C.F.R. §1.56(a).

Inasmuch as this Information Disclosure Statement is being submitted after the issuance of a first Office Action on the merits, but prior to the issuance of a final Official Action or a Notice of Allowance, in accordance with the provisions of 37 C.F.R. §1.97(c), authorization is given to charge applicants' account the fee set forth in 37 C.F.R. §1.17(p).

Respectfully submitted,


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Reg. No. 32,211

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Form PTO-1449 (REV. 7-80)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		Atty. Docket No. 7913ZY		Serial No. 08/471,890	
LIST OF PRIOR ART CITED BY APPLICANT (Use several sheets if necessary)				Applicant Donald R. Huffman, et al.			
				Filing Date June 7, 1995		Group 1103	
PATENT DOCUMENTS							
EXAMINER INITIAL*		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE (if appropriate)
	AA	2,635,994	4/27/50	Tierman			
	AB	2,957,756	10/60	Bacon			
	AC	3,009,783	12/4/59	Sheer, et al.			
	AD	3,172,774	2/28/61	Diefendorf			
	AE	3,317,354	5/2/67	Darrow, et al.			
	AF	4,132,671	2/2/79	Deininger, et al.			
	AG	4,167,444	9/11/79	Schweiger			
	AH	4,435,375	3/6/84	Tamura, et al.			
	AI	4,435,378	3/6/84	Reck, et al.			
	AJ	4,767,608	8/30/88	Matsumoto, et al.			
FOREIGN PATENT DOCUMENTS							
		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION
							YES NO
	AK	GB 2 101 983 A	2/23/83	United Kingdom			
	AL	2 160 696	6/20/90	Japan			
	AM	2 221 194	2/21/89	Japan			
	AN	1,587,000	8/23/90	Russia			
	AO	2,414,215	1/8/76	Germany			
OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
	AP	Aihara et al., Spherical Aromaticity of Buckminsterfullerene, <u>Bull. Chem. Soc. Jpn.</u> , 61, 1988, pp. 2657-2659					
	AR	Akhter, et al., The Structure of Hexane Soot II: Extraction Studies, <u>Applied Spectroscopy</u> , 39(1), 1985, pp. 154-167					
	AS	Almlof et al., Theoretical Methods and Results for Electronic Structure Calculations on Very Large Systems Carbon Clusters, <u>ACS Symposium Series</u> , 353, 1987, pp. 35-48					
	AT	Amato, A First Sighting of Buckyballs in the Wild, <u>Science</u> , 257(5067), 1992, p. 167					
	AU	Amic et al., On the Lack of Reactivity of Buckminsterfullerene: A Theoretical Study, <u>J. Chem. Soc. Perkin Trans.</u> , 1990, pp. 1595-1598					
	AV	Bacon, R., <u>J. Applied Physics</u> , 31(2), 1960, pp. 283-290					
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AA	4,915,977	4/10/90	Okamoto, et al.				
AB	4,922,827	5/8/90	Remo				
AC	5,114,477	5/19/92	Mort, et al.				
AD	5,132,105	7/21/92	Remo				
AE	5,234,474	6/19/91	Whewell				
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
AP	Balasubramanian et al., Computer Generation of Spectra of Graphs: Applications to C ₆₀ Clusters and Other Systems, <u>Journal of Computational Chemistry</u> , 9(4), 1988, pp. 406-415						
AR	Ballester et al., Atoms in Carbon Cages as a Source of Interstellar Diffuse Lines, <u>The Astrophysical Journal</u> , 356, 1990, pp. 507-512						
AS	Blau et al., An Investigation of the Microfrictional Behavior of C ₆₀ Particle Layers on Aluminum, <u>Thin Solid Films</u> , 219, 1993, pp. 129-134						
AT	Bloomfield et al., Negative and Positive Cluster Ions of Carbon and Silicon, <u>Chemical Physics Letters</u> , 121(1) (2), 1985, pp. 33-37						
AU	Bochvar et al., Problems in the Structural Chemistry of Crystalline Carbon, <u>Sov. Sci. Rev. B. Chem.</u> , 9, 1987, pp. 483-527						
AV	Brendsdal et al., Normal Coordinate Analysis of "Footballene" C ₆₀ , <u>Spectroscopy Letters</u> , 21(4), 1988, pp. 313-318						
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	AP	Brendsdal, Symmetry Coordinates of Molecular Vibrations of "Footballene" C ₆₀ , <u>Spectroscopy Letters</u> , 21(4), 1988, pp. 319-339					
	AR	Brendsdal et al., Kekule Structures of Footballene, <u>Journal of Molecular Structure (Theochem)</u> , 1989, pp. 55-66					
	AS	Brown, High Symmetries in Quantum Chemistry, <u>Chemical Physics Letters</u> , 136(2), 1987, pp. 128-133					
	AT	Buseck et al., Fullerenes from the Geological Environment, <u>Science</u> , 257(5067), 1992, pp. 215-217					
	AU	Bussioletti, Dusty Objects in the Universe, pp. 89-93					
	AV	Campbell et al., An Intense, Simple Carbon Cluster Source, <u>J. Chem. Phys.</u> , 93(9), 1990, pp. 6900-6907					
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
	AP	Caulemans et al., SO(4) Symmetry and the Static Jahn-Teller Effect in Icosahedral Molecules, <u>Physical Review A</u> , 39(2), 1989, pp. 481-493					
	AR	Ceulemans et al., The Jahn-Teller Instability of Fivefold Degenerate States in Icosahedral Molecules, <u>J. Chem. Phys.</u> , 93(2), 1990, pp. 1221-1234					
	AS	Coulantbeau et al., Calculs de Proprietes Electroniques et des Frequences Normales de Vibration D'Agregats Carbones Formant Des Polyedres Reguliers et Semi-Reguliers, <u>Journal de chimie physique</u> , 84, 1987, pp. 7-8					
	AT	Cox et al., C ₆₀ La: A Deflated Soccer Ball?, <u>J. Am. Chem. Soc.</u> , 108, 1986, pp. 2457-2458					
	AU	Cox et al., Carbon Clusters Revisited: The "Special" Behavior of C ₆₀ and Large Carbon Clusters, <u>J. Chem. Phys.</u> , 88(3), 1988, pp. 1588-6907					
	AV	Creasy, Some Model Calculations of Carbon Cluster Growth Kinetics, <u>J. Chem. Phys.</u> , 92(12), 1990, pp. 7223-7233					
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AP	Creasy et al., Large Carbon Cluster Ion Formation by Laser Ablation of Polyamide and Graphite, <u>Chemical Physics</u> , 126, 1988, pp. 453-468	
AR	Creasy et al., Formation of High Mass Carbon Cluster Ions from Laser Abiation of Polymers and Thin Carbon Films, <u>J. Chem. Phys.</u> , 92(4), 1990, pp. 2269-2277	
AS	Curl et al., Probing C ₆₀ , <u>Science</u> , 242, 1988, pp. 1017-1022	
AT	Curl et al., Fullerenes, <u>Scientific America</u> , 1991, pp. 54-64	
AU	Cyvin et al., Molecular Vibrations of Footballene, <u>Chemical Physics Letters</u> , 143(4), 1988, pp. 377-380	
AV	Daniel, Jr., Studies Toward a Convergent Synthesis of C ₆₀ , <u>Dissertation Abstracts International</u> , 49(5), 1988, p. 1706-B	
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Form PTO-1449 (REV. 7-88)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		Atty. Docket No. 7913ZY		Serial No. 08/471,890	
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
	AP	Dias, A Facile Huckel Molecular Orbital Solution of Buckminsterfullene Using Chemical Graph Theory, <u>Journal of Chemical Education</u> , 66(12), 1989, pp. 1012-1015					
	AR	Dietz et al., Laser Production of Supersonic Metal Cluster Beams, <u>J. Chem. Phys.</u> , 74(1), 1981, pp. 6511-6512					
	AS	Disch et al., On Symmetrical Clusters of Carbon Atoms: C ₆₀ , <u>Chemical Physics Letters</u> , 125(5)(6), 1986, pp. 465-466					
	AT	Ebbesen, et al., Origins of Fullerenes in Rocks, <u>Science</u> , 268, 1995, pp. 1634-1635					
	AU	Elser et al., Magnetic Behavior of Icosahedral C ₆₀ , <u>Physical Review of General Physics Third Series</u> , 36(10), 1987, pp. 4579-4585					
	AV	Elser et al., Icosahedral C ₆₀ : An Aromatic Molecule with a Vanishingly Small Ring Current Magnetic Susceptibility, <u>Nature</u> , 325, 1987, pp. 792-794					
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
	AP	Feld et al., Carbon Cluster Emission from Polymers Under Kilolectronvolt and Magaelectronvolt Ion Bombardment, <u>J. Phys. Chem.</u> , 94, 1990, pp. 4595-4599					
	AR	Feng et al., Quantum-Chemical Investigation of Buckminsterfullerene and Related Carbon Clusters (I):The Electronic Structure and UV Spectra of Buckminsterfullerene and Other C ₆₀ Cages, <u>International Journal of Quantum Chemistry</u> , XXXVII, 1990, pp. 509-607					
	AS	Fowler et al., π -Systems in Three Dimensions, <u>Chemical Physics Letters</u> , 127(1), 1986, pp. 78-83					
	AT	Fowler, Carbon Cylinders:A Class of Closed-shell Clusters, <u>J. Chem. Soc. Faraday Trans.</u> , 86(2), 1990, pp. 2073-2077					
	AU	Fowler, How Unusual is C ₆₀ ? Magic Numbers for Carbon Clusters, <u>Chemical Physics Letters</u> , 131(6), 1986, pp. 444-450					
	AV	Fowler et al., Systematics of Bonding in Non-Icosahedral Carbon Clusters, <u>Theor. Chim. Acta</u> , 73, 1988, pp. 1-26					
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
AP	Fowler et al., Electric and Magnetic Properties of the Aromatic Sixty-Carbon Cage, <u>Chemical Physical Letters</u> , 165(1), 1990, pp. 79-86						
AR	Fowler et al., The Leapfrog Principle: A Rule for Electron Counts of Carbon Clusters, <u>J. Chem. Soc., Chem. Commun.</u> , 1987, pp. 1403-1405						
AS	Gerhardt et al., Polyhedral Carbon Ions in Hydrocarbon Flames, <u>Chemical Physical Letters</u> , 137(4), 1987, pp. 306-310						
AT	Gerhardt et al., The Formation of Polyhedral Carbon Ions in Fuel-Rich Acetylene and Benzene Flames, Twenty-Second Symposium (International) on Combustion/The Combustion Institute, 1988, pp. 395-401						
AU	Gerhardt et al., Large Ionic Species in Sooting Acetylene and Benzene Flames, AGARD Proc. No. 422, Combustion and Fuels in Gas Turbine Origins, 1988, p. 22-1-22-11						
AV	Gerhardt et al., Polyhedral Carbon Ions in Hydrocarbon Flames, <u>Chemical Physics Letters</u> , 137(4), 1987, pp. 306-310						
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	AR	Geusic et al., Photodissociation of Carbon Cluster Cations, <u>J. Chem. Phys.</u> , 86(7), 1987, pp. 3862-3869					
	AS	Haddon, Measure of Nonplanarity in Conjugated Organic Molecules: Which Structurally Characterized Molecule Displays the Highest Degree of Pyramidalization?, <u>J. Am. Chem. Soc.</u> , 112, 1990, pp. 3385-3389					
	AT	Haddon et al., Electronic Structure and Bonding in Icosahedral C ₆₀ , <u>Chemical Physics Letters</u> , 125(5)(6), 1986, pp. 459-464					
	AU	Haddon et al., Icosahedral C ₆₀ Revisited: An Aromatic Molecule with a Vanishingly Small Ring Current Magnetic Susceptibility, <u>Chemical Physics Letters</u> , 169(4), 1990, pp. 362-364					
	AV	Haddon et al., Rehybridization and π -Orbital Alignment: The Key to the Existence of Spheroidal Carbon Clusters, <u>Chemical Physics Letters</u> , 131(3), pp. 165-169					
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	AP	Hahn et al., Magic Numbers in C_{2n} and C_n Abundance Distributions, <u>Chemical Physics Letters</u> , 130(1)(1), 1986, pp. 12-16					
	AR	Hale, Discrete-Variational-X Alpha Electronic Structure Studies of the Spherical C_{60} Cluster: Prediction of Ionization Potential and Electronic Transition Energy, <u>J. Am. Chem. Soc.</u> , 108, 1986, pp. 6087-6088					
	AS	Harano et al., Decomposition of Gaseous Hydrocarbons in a Laser-induced Plasma as a Novel Carbonaceous Source for Cluster Formation, <u>Chemical Physics Letters</u> , 172(3)(4), 1990, pp. 219-223					
	AT	Hargittai et al., Quasicrystals, Networks and Molecules of Fivefold Symmetry, pp. 239-287					
	AU	Harter et al., Rovibrational Spectral Fine Structure of Icosahedral Molecules, <u>Chemical Physics Letters</u> , 132(4)(5), 1986, pp. 387-392					
	AV	Harter et al., Rotation-Vibration Spectra of Icosahedral Molecules. I. Icosahedral Symmetry Analysis and Fine Structure, <u>J. Chem. Phys.</u> 90(9), 1089, pp. 4727-4743					
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